

THE TEMPERATURE CORRECTION OF PETROL

**Issues Paper prepared by the Australian Institute of Petroleum in
response to the CSIRO Volume-Temperature Profile Study.**



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1. OVERVIEW

1.1 The CSIRO Study

- The CSIRO Volume-Temperature Profile Study found that:
 - ♦ The estimated national mean delivery temperature of petrol to service stations is **20.3°C**.
 - ♦ The estimated national mean sale temperature of petrol from service stations is **21.7°C**.
- The differences between the temperature at which petrol is delivered into retail sites and the sales temperature are small.

1.2 Variations in the sales temperatures between consumers

- There are variations in the sales temperatures of petrol between consumers in different regions. These variations to consumers are small (e.g. Queensland less than 5°C) and balance out on a national basis. All other factors being equal, consumers in warmer regions are slightly notionally disadvantaged, while consumers in cooler regions are slightly notionally advantaged. Oil companies do not benefit from this effect.

1.3 Temperature correction would not advantage consumers in any State.

- The oil industry has reviewed the costs of introducing temperature correction, including independent advice on the methodology of the costings.
- The costs of implementing temperature correction are \$300 million in capital costs (which almost equals the total annual profits of the downstream oil industry) and \$50 million per year in operating costs.
- The increased costs to the oil industry through the introduction of mandatory temperature correction at the retail level would be passed on to consumers, resulting in higher petrol prices.
- The increases in petrol prices from temperature correction outweigh any possible gains to consumers in warmer States. Consumers in cooler States would be doubly disadvantaged.
- A mandatory change from ambient volumes to temperature corrected volumes could cause considerable confusion amongst consumers, since when consumers purchased a litre of petrol they would no longer be guaranteed of receiving a litre.

1.4 The 15°C reference temperature

- The use of a 15°C reference temperature for the collection of excise ensures that there is consistency in the taxation base. This is unrelated to issues of equity between consumers. The 15°C figure does not represent the average temperature of petrol.

1.5 Temperature correction is not in the national interest

- The Industry Commission Report into Petroleum Products (July, 1994) stated that mandatory temperature correction is not justified.
- Access Economics found that consumers would pay higher prices and that from the national perspective, temperature correction would entail net costs and losses to Australia.

1.6 Temperature correction is not international practice

- No country has adopted mandatory temperature correction for retail petrol sales.

- Other countries have also examined retail temperature correction but have rejected it because the costs outweighed any possible benefits.

2. THE ISSUES

The issues:

- The measurement of petroleum products delivered to service stations, and
- The measurement of petroleum products to motorists.

These issues arose from recommendations made in 1991 by the National Standards Commission (NSC) that petrol should be sold to motorists at the retail level on the basis of temperature corrected volume. Petrol changes in volume at a rate of about 0.00125 for every 1 °C.

3. THE CSIRO STUDY

CSIRO was commissioned by the Australian Institute of Petroleum (AIP), the Motor Trades Association of Australia (MTAA) and the Australian Petroleum Agents and Distributors Association (APADA) to undertake a Study of the volume/temperature profiles of petrol deliveries and sales on a national basis over a complete year.

The CSIRO Study found that:

- The estimated national mean delivery temperature of petrol is **20.3°C**, the 95 per cent confidence interval for this mean is 19.6°C to 20.9°C.
- The estimated national mean sale temperature of petrol is **21.7°C**, the 95 per cent confidence interval for this mean is 21.1°C to 22.3°C.

The CSIRO Study included information on deliveries and sales in each State and Territory. The estimated spread of temperatures for the States and Territories is shown in *Chart 1* and *Table 1* below.

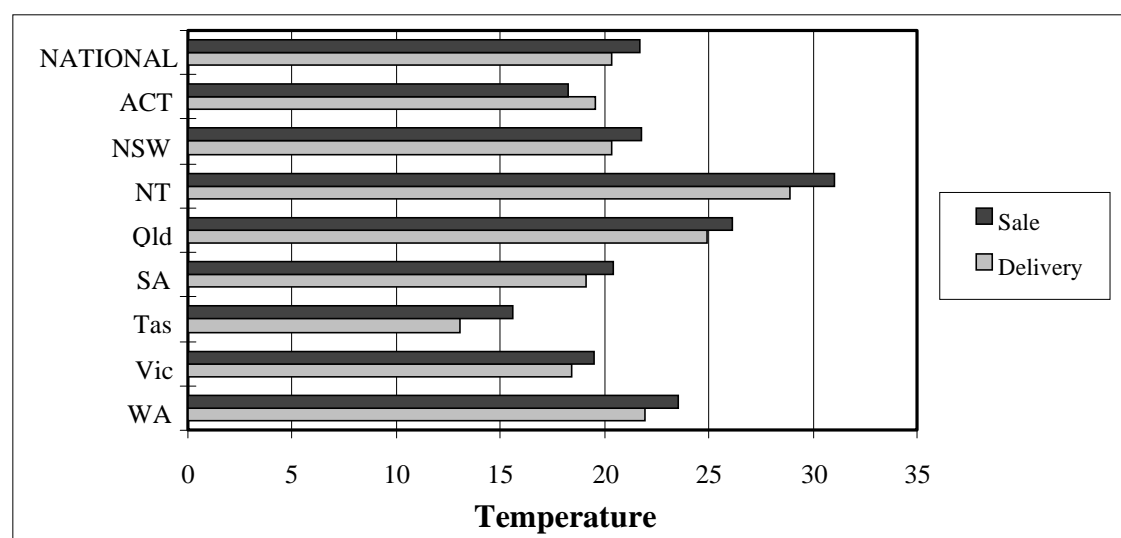


Chart 1

Region	Average Delivery Temp °C	Average Sale Temp °C	Variation Sales - Delivery °C	Variation from National Average Sale Temp °C
National	20.3	21.7	1.4	----
ACT	19.6	18.3	-1.3	-3.4
NSW	20.3	21.8	1.5	0.1
NT	28.9	31.0	2.1	9.3
Qld	24.9	26.1	1.2	4.4
SA	19.1	20.4	1.3	-1.3
Tas	13.1	15.6	2.5	-6.1
Vic	18.4	19.5	1.1	-2.2
WA	21.9	23.5	1.6	1.8

Table 1

3.1 Impact on Resellers

Temperature variations have a negligible impact on resellers. The CSIRO Study indicates that nationally there is a slight temperature gain for resellers between the delivery and the sale of petrol. This slight gain in temperature is apparent for all regions except the ACT, however the ACT statistics should be regarded with some caution due to the small sample size.

3.2 Variations between consumers in different regions

Deviations of the estimated State mean sale temperatures from the estimated national mean sale temperature range from minus 6.1°C for Tasmania to plus 4.4°C for Queensland and plus 9.3°C for the Northern Territory. This is illustrated in *Chart 2* below.

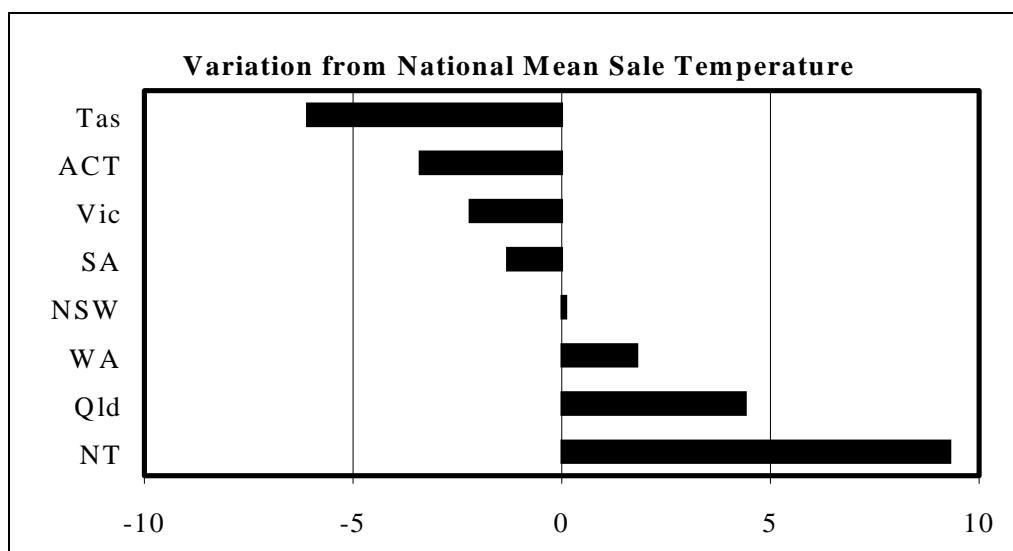


Chart 2

4. NOTIONAL DISTRIBUTIONAL COST VARIATIONS

Notional distributional cost variations can be estimated by comparing the regional mean sales temperature with the national mean sales temperature. While some regions will have a slight increase in notional costs due to relatively warmer ambient temperatures, other regions will enjoy a slight decrease in notional costs due to relatively cooler ambient temperatures.

Region	Variation from Mean National Sales Temp °C	Petrol Retail Sales 1995 (ML) ¹	Estimated Volume Change (ML)	Estimated Petrol Retail Prices ²	Notional Cost Variation between motorists \$ per year ³
ACT ⁴	-3.4	196.6	-0.8	\$0.75	(\$6.37)
NSW	0.1	3932.6	0.5	\$0.73	\$0.18
NT	9.3	104.3	1.2	\$0.75	\$17.39
Qld	4.4	2320.7	12.8	\$0.66	\$7.24
SA	-1.3	970.1	-1.6	\$0.75	(\$2.45)
Tas	-6.1	253.8	-1.9	\$0.76	(\$11.61)
Vic	-2.2	2958.4	-8.1	\$0.75	(\$4.11)
WA	1.8	1461.1	3.3	\$0.77	\$3.44

Table 2

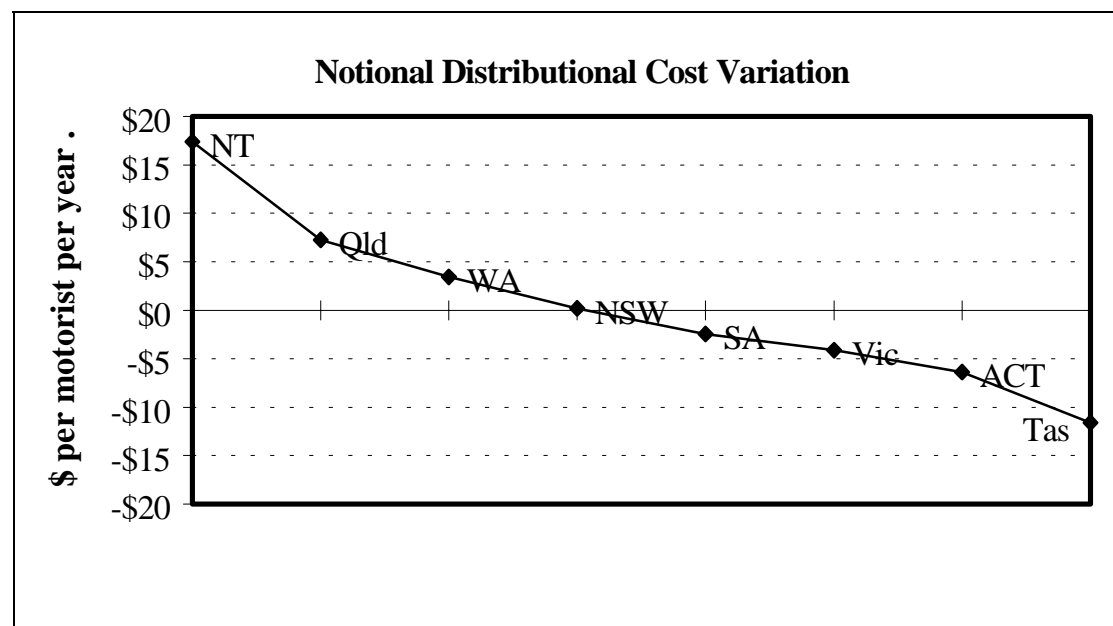


Chart 3

On the basis of *Table 2* and *Chart 3*, the average petrol sale in Queensland takes place at temperatures 4.4°C above the national average. For the average Queensland motorist, this might equate to about \$7 extra per year on petrol compared to the average Australian motorist.⁵ By contrast, the average Victorian motorist might spend \$4 less per year and the average Tasmanian motorist might spend \$11 less per year on petrol.

¹ Department of Primary Industry and Energy statistics

² AIP monthly dissection of retail petrol prices, Dec 1995

³ Assumes annual consumption of 2,000 litres per year.

⁴ ACT Retail Sales figures are included for statistical purposes within NSW, however an estimate of ACT (and adjustment for NSW) has been made on the basis of the relative populations.

⁵ Calculated as follows:

5. EXCISE AND FRANCHISE FEES

5.1 Excise

Federal excise on petrol is collected by Customs at a temperature corrected rate of 15°C. This excise is imposed directly on to the refiner marketer companies, not the motorists. The companies then seek to recover this excise in the market through their pricing structure.

However, it should be noted that:

- These arrangements have no significant impact on motorists.
- Unlike taxation imposed directly at the point of sale, there is no guarantee of recovering this excise from the market. This may lead to circumstances in which the companies do not receive from the market the full amount of the excise paid. The means by which oil companies internally allocate this cost recovery is irrelevant to the excise collection.
- It would be totally unjustifiable to require oil companies to undertake a major investment in temperature correction, simply for the purpose of managing a tax imposed on the industry.

The use of a 15°C reference temperature by Customs for the purposes of calculating excise is to ensure consistency and uniformity in the tax base.

5.2 State Franchise Fees

State Franchise Fees are collected at the wholesale point of sale by the license holders. The State Franchise Fees are therefore calculated at the ambient temperature of the product.

$$4.4 \times 0.00125 = 0.0055.$$

$$0.0055 \times 65.8 \text{ cpl (Dec 95 estimated Brisbane ULP retail price)} = 0.36 \text{ cpl.}$$

$$\text{Assume 2,000 litres per motorist per year} = \$7.24$$

6. THE COSTS AND BENEFITS OF TEMPERATURE CORRECTION

6.1 The costs of temperature correction

AIP contends that it would not be feasible to introduce temperature correction at only the retail level, since this would inevitably generate trade measurement discrepancies between wholesalers and retailers. Stock management within the industry is currently done on the basis of ambient temperatures. A change to temperature correction at the retail level would demand similar changes at the wholesale level. Therefore, any proposal to introduce temperature correction must include both the wholesale and the retail sectors.

AIP has reviewed its cost estimates and commissioned Ernst & Young to assess the methodology employed, to ensure that cost estimates are robust. The revised estimates for the introduction of temperature correction at the wholesale and retail levels are:

- capital costs of \$300 million
- annual operating costs of \$50 million

Put into perspective, an additional capital cost of \$300 million represents almost the total annual profits of the four refiner marketer companies in the Australian downstream oil industry.⁶ The costs of introducing temperature correction would therefore have to be recovered from the consumers through the market.

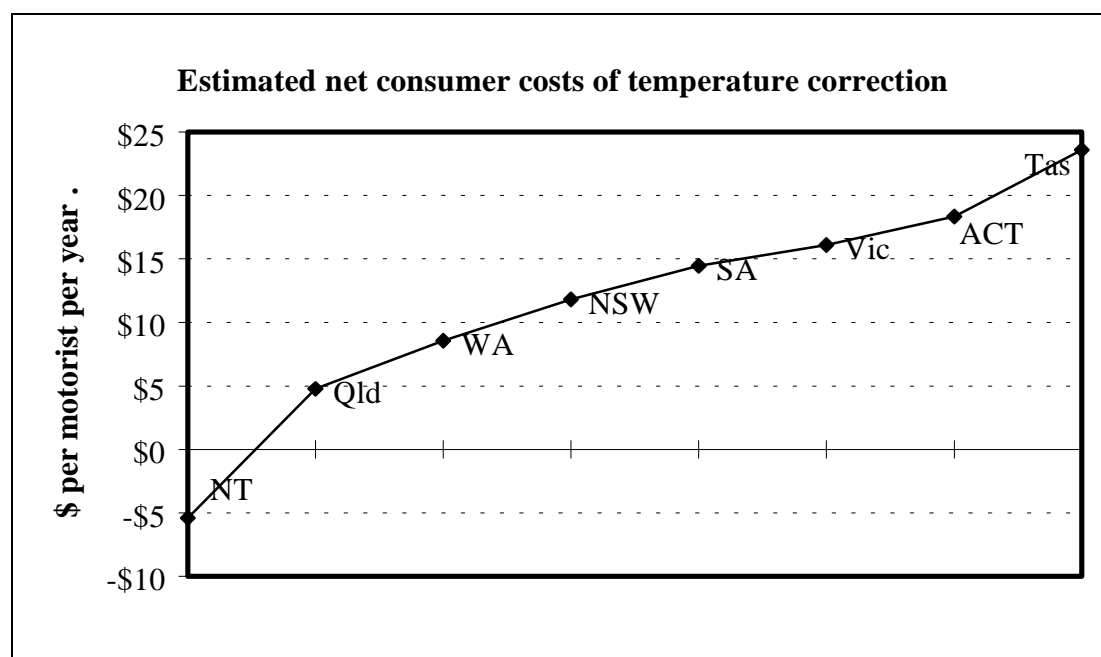


Chart 4

The average cost of temperature correction would be likely to exceed \$12 per motorist per year. For an average Queensland motorist the cost of achieving notional equity would mean a real net loss of about \$5 per year and for an average Tasmanian motorist a real net loss of about \$24 per year [see *Chart 4* above]. The unit costs of introducing temperature correction would also be greater per litre of petrol sold in the low volume markets, such as rural Australia. These additional costs would impact significantly on consumers in these low volume markets.

⁶ Ernst & Young; (1995); Downstream Oil Financial Survey; p.8

AIP believes that there are rational limits to the resources that should be committed to the measurement of a product and contends that achieving highly exacting measurement standards will not be worthwhile if the costs exceed any claimed benefits.

6.2 No benefits from temperature correction

There is no national benefit to be derived from a change to the temperature correction of petrol. There would be no benefit to consumers in aggregate. Eliminating the small temperature differences between regions would incur a substantial cost penalty.

6.3 Consumer confidence

AIP contends that there is no reason to believe consumers lack confidence in the present ambient measurement of petrol at retail sites. Changing the retail sale of petrol from ambient volumes to temperature corrected volumes would create considerable confusion amongst consumers.

On the issue of consumer confidence, the North Carolina Department of Agriculture described it well in commenting that:

“Many customers (service station operators and wholesale petroleum marketers) are sceptical of any system which shows you are being billed for more gallons than are being delivered.”⁷

AIP contends that at the retail level the consumer confidence issue would be far greater than at the wholesale level described above. Automatic Temperature Compensation (ATC) equipment installed at retail sites would adjust dispensed volumes with each change in petrol temperature. Depending upon the temperature at the time of sale, under temperature correction a consumer might receive ‘big litres’ or ‘little litres’.

Temperature correction at the retail level would mean that generally consumers in cooler regions would be purchasing ‘little litres’, while those consumers in warmer regions would be purchasing ‘big litres’. Temperature correction would mean that consumers in regions with cooler ambient temperatures would be likely to blame the oil companies, petrol retailers and governments for the fact that they were being sold smaller volumes of petrol.

Under the present ambient measurement of petrol at the retail level, a litre still equals a litre; since a litre of petrol will occupy the same volume as a litre of any other liquid.

⁷

Letter dated 24 August, 1992

7. THE INDUSTRY COMMISSION

The Industry Commission devoted one chapter of the Report into Petroleum Products (July, 1994) to the issue of temperature correction:

*“Petrol expands as temperature rises. This has led to calls for mandatory introduction of petrol pump gauges that correct for temperature effects. However, the costs of temperature correction may be large. The benefits, if any, will not be available until after a long phasing-in period; and in any case self correcting forces are at work in the market place. When trialled in several Canadian provinces, temperature correction did not lower prices or otherwise win consumer favour.”*⁸

The Industry Commission stated that there were market responses that mitigated measurement errors:

*“The argument about offsetting market responses does not assert that accurate measurement does not matter. The proposition is that market pressures compensate for slight inaccuracies in measurement. Sellers routinely strive for competitive advantage by investing in reputations for quality, reliability and accuracy. Existing voluntary market practice suggests that investing in temperature correction equipment is worthwhile only for big transactions.”*⁹

The Industry Commission concluded that:

“Based on available data, there is no evidence of a problem sufficient to justify the mandatory introduction of temperature correction. Costs of correction may be large; the benefits, if any, would not be available until perhaps the second decade of the next century; and in any case self correcting forces are at work in the market place.

The Commission considers that mandatory temperature correction is not warranted on economic efficiency grounds.”¹⁰

⁸ Industry Commission; (1994); *Report into Petroleum Products*; p.243

⁹ Industry Commission; (1994); *op cit*; pp.248-9

¹⁰ Industry Commission; (1994); *op cit*; p.249

8. ACCESS ECONOMICS

A report prepared for AIP by Access Economics on the temperature correction issue stated that:

“Introduction of costly temperature correction equipment can only add to supplier costs, and these will have to be passed on to customers in a competitive market. In addition, regulations requiring installation of temperature correction equipment will divert resources from more productive uses.

As a result:

- from the national perspective, temperature correction entails net costs and losses to Australia;
- customers generally will face higher prices than would otherwise be possible.”¹¹

Access Economics further stated that:

“The central argument for temperature correction is an equity argument: that is, the “benefits” of temperature correction are essentially *distributional* benefits. The case for correction is *not* intrinsically an efficiency argument at all: gross costs of temperature correction *are* a quantifiable drain on scarce resources, but the gross benefits are gains to some at the expense of others *within* the economy.

In net terms, from a national economic perspective, temperature correction by definition is a *negative-sum proposal*. The economy as a whole must lose if temperature correction is costly, with the distribution of that loss depending on the temperature at which sales are made.

This is not an argument against having *any* measurement standards at all. Rather, it suggests that the amount of resources that is tied up in measuring a product need to be limited. It will not be worth achieving very exacting measurement standards if the costs are very large.”¹²

¹¹ Access Economics; (1992); *Temperature Correction Consumer Friendly or Consumer Hostile?*; pp. (i)-(ii).

¹² Access Economics; (1992); *op cit*; p.4

9. INTERNATIONAL PRACTICE

International practice does not support temperature correction. Mandatory temperature correction at the retail level does not apply in any country. If the suggestions of the National Standards Commission were adopted, Australia would be the first country in the world to have mandatory retail temperature correction of petrol sales. AIP maintains that Australia's current ambient petroleum measurement system is cost effective, functional and in conformance with international practice.

9.1 The United States

State Governments in the United States have jurisdiction for most weights and measures matters. No US States require automatic temperature correction at the retail level. Four US States prohibit temperature correction, six US States permit temperature correction for large wholesale transactions and only two US States have mandatory temperature correction for large wholesale transactions. The State legislation on temperature correction falls into the following four categories:

- Prohibition
- Permissible / Conditional
- Purchaser Option
- Mandatory

In Minnesota, Montana, New Jersey and South Dakota there are various forms of prohibition on the temperature correction of fuels.

In North Carolina, North Dakota and Pennsylvania temperature correction is permitted under certain conditions, such as when both buyer and seller agree.

In California, Colorado and Idaho, wholesale purchasers have the option to require temperature correction on sales above certain minimums.

In Arizona and Texas, temperature correction is mandatory only at the wholesale level on sales of over 18,925 litres (5,000 US Gallons). In Hawaii, there is a mandatory recalibration of pumps to reflect a high average local temperature, however it does not vary with the actual temperature.¹³

In a report on temperature correction in the United States, the authors commented that:

“The principle argument against requiring temperature adjustment at the retail service station level is that it could impose hundreds of millions of dollars in capital for retrofit and new installations without commensurate benefits. The costs of purchasing and maintaining automatic temperature compensators would be passed on to the consumer; the increased costs of regulating this practice would be passed on to the taxpayer ... all without increasing the supply of product. To the extent that the petroleum product market is competitive and that all outlets in a given market area are similarly affected by temperature changes, there should be little or no gain or loss to the consumer from the effects of product shrinkage or expansion ... In this way the

¹³ Hawaii implemented a mechanical/manual recalibration of retail pumps to reflect an average temperature of 80°F (26.6°C), to create in the local jargon the “Hawaiian Gallon”. This change does not take into account any variations in season or altitude. Hawaii actually has an average temperature of 77°F (25°C) with average lows of 57°F (14°C) and average highs of 97°F (36°C).

market itself serves to remove inequities within a market area - assuming a high degree of competition.”¹⁴

9.2 Canada

Temperature correction is compulsory only at terminals for the purpose of collecting petrol taxes. Some retailers, comprising about 5% of the market, are using temperature corrected pumps as a marketing device, but it is not required by law.

9.3 United Kingdom

There is no temperature correction at the wholesale or retail levels. Oil companies use temperature corrected volumes for exchange agreements within the industry. Studies have suggested that gains and losses at retail sites balance out over the year.

9.4 Scandinavia

In Sweden, the gains and losses due to climate are estimated to balance, so no action has been taken. In Norway, dealers have pressed for temperature correction but resistance from other sections of the industry has meant that no action has been taken. In Finland, the dealers have also demanded temperature correction, but again no action has been taken on the basis that the gains and losses balance over a full year.

¹⁴ Davis R, Dickerman J and Radian Corporation, (Sep 1982); *Temperature Adjustment of Petroleum Products: Analysis of Data and Issues*; pp. 6-15. Prepared for the American Petroleum Institute (API)